CLAIMS

1.   A method of forwarding data over a network from a source node to a destination node, comprising:

    providing a subnetwork within the network having a plurality of subnetwork nodes connected by a plurality of subnetwork links, the subnetwork nodes including an ingress node and an egress node coupled to the source node and the destination node, respectively, at least one pair of subnetwork nodes being connected by a plurality of subnetwork links, the plurality of subnetwork nodes and the plurality of subnetwork links defining a plurality of subnetwork paths between the ingress node and the egress node;

    forwarding a signal from the ingress node to the egress node along a route through a subset of subnetwork nodes between the ingress node and the egress node, said signal requesting a response from each node along the route; and

    receiving response signals from the nodes along the route, the response signals defining a plurality of paths within the route between the ingress node and the egress node.

2.   The method of claim 1 wherein the subnetwork comprises a label-switching network.

3.   The method of claim 2 wherein the network comprises nodes which forward data using Internet protocol node addresses.

1   4.   The method of claim 2 wherein each subnetwork node along the route allocates

2   a plurality of labels for the plurality of paths along the route.

1   5.   The method of claim 2 wherein:

2   the ingress node is coupled to a plurality of source nodes; and

3   each source node coupled to the ingress node is associated with one of

4   the plurality of paths along the route between the ingress node and the egress

5   node.

     6.   The method of claim 2 wherein:

              the egress node is coupled to a plurality of destination nodes; and

              each destination node coupled to the egress node is associated with one

              of the plurality of paths along the route between the ingress node and the

              egress node.

     7.   The method of claim 2 further comprising associating each packet of data to be

              transferred from a particular source node to a particular destination node with

              one of the plurality of paths between the ingress node and the egress node.

1   8.   The method of claim 7 wherein the associating comprises performing a logical

2   operation on information carried in each packet of data.

1   9.   The method of claim 8 wherein the logical operation comprises a hash

2   operation.

1   10.   The method of claim 8 wherein the logical operation is performed on an

2   address field in the packet of data.

1   11.   The method of claim 8 wherein the logical operation is performed on a

2   protocol field in the packet of data.

1   12.   The method of claim 2 wherein a response signal includes a label word which

2   defines a plurality of data bits, a first subset of the defined data bits being

associated with the route between the ingress node and the egress node and a

second subset of the defined data bits being associated with the plurality of

paths within the route.

13.   The method of claim 12 wherein the data bits of the second subset of the

defined data bits are not assigned values by the node that generated the

response signal.

14.   The method of claim 12 wherein the number n of data bits in the second subset

of the defined data bits determines the number N of defined paths within the

route.

1   15.   The method of claim 14 wherein $N=2^n$.

1   16.   The method of claim 1 wherein:

2   the ingress node is coupled to a plurality of source nodes; and

3   each source node coupled to the ingress node is associated with one of

4   the plurality of paths along the route between the ingress node and the egress

5   node.

1 17. The method of claim 1 wherein:

2 the egress node is coupled to a plurality of destination nodes; and

3 each destination node coupled to the egress node is associated with one

4 of the plurality of paths along the route between the ingress node and the

5 egress node.

1 18. The method of claim 1 wherein a subnetwork link between a pair of

subnetwork nodes is assigned to carry a plurality of the defined paths between

the ingress node and the egress node.

19. The method of claim 1 wherein the plurality of subnetwork links connecting

the at least one pair of subnetwork nodes form a single logical link used in

forwarding the data from the ingress node to the egress node.

20. An apparatus for forwarding data over a network from a source node to a

destination node, comprising:

a subnetwork within the network having a plurality of subnetwork

nodes connected by a plurality of subnetwork links, the subnetwork nodes

5 including an ingress node and an egress node coupled to the source node and

6 the destination node, respectively, at least one pair of subnetwork nodes being

7 connected by a plurality of subnetwork links, the plurality of subnetwork nodes

8 and the plurality of subnetwork links defining a plurality of subnetwork paths

9 between the ingress node and the egress node; and

10 a communication subsystem within the subnetwork for (i) forwarding a

11 signal from the ingress node to the egress node along a route through a subset

12 of subnetwork nodes between the ingress node and the egress node, said signal

13 requesting a response from each node along the route, and (ii) forwarding

14   response signals from the subnetwork nodes along the route, the response

15   signals defining a plurality of paths within the route between the ingress node

16   and the egress node.

1   21.   The apparatus of claim 20 wherein the subnetwork comprises a label-switching

2   network.

1   22.   The apparatus of claim 21 wherein the network comprises nodes which

2   forward data using Internet protocol node addresses.

23.   The apparatus of claim 21 wherein each subnetwork node along the route

                allocates a plurality of labels for the plurality of paths along the route.

24.   The apparatus of claim 21 wherein:

                    the ingress node is coupled to a plurality of source nodes; and

                    each source node coupled to the ingress node is associated with one of

                the plurality of paths along the route between the ingress node and the egress

                node.

1   25.   The apparatus of claim 21 wherein:

2   the egress node is coupled to a plurality of destination nodes; and

3   each destination node coupled to the egress node is associated with one

4   of the plurality of paths along the route between the ingress node and the

5   egress node.

1   26.   The apparatus of claim 21 wherein a response signal includes a label word

2   which defines a plurality of data bits, a first subset of the defined data bits

3   being associated with the route between the ingress node and the egress node

1   and a second subset of the defined data bits being associated with the plurality

2   of paths within the route.

1   27.   The apparatus of claim 26 wherein the data bits of the second subset of the

2   defined data bits are not assigned values by the node that generated the

3   response signal.

1   28.   The apparatus of claim 26 wherein the number n of data bits in the second

              subset of the defined data bits determines the number N of defined paths within

              the route.

       29.   The apparatus of claim 20 wherein a subnetwork link between a pair of

             subnetwork nodes is assigned to carry a plurality of the defined paths between

             the ingress node and the egress node.

       30.   The apparatus of claim 20 wherein the plurality of subnetwork links

             connecting the at least one pair of subnetwork nodes form a single logical link

             used in forwarding the data from ingress node to the egress node.